U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASS. 02154

ADDRESS REPLY TO:
DIVISION ENGINEER

REFER TO FILE NO.

NEDED-D

16 July 1964

SUBJECT: Report on Provision of Fishery Storage in Colebrook River Dam and Reservoir, Farmington River, Connecticut River Basin, Connecticut and Massachusetts

TO: Chief of Engineers
ATTN: ENGCW-E
Washington, D. C.

1. In accordance with the agreement made with Colonel R. C. Marshall on 2 July 1964, there is submitted herewith a report entitled "Provision of Fishery Storage in Colebrook River Dam and Reservoir, Farmington River, Connecticut River Basin, Connecticut and Massachusetts." This report is submitted to present basic data concerning the fishery storage in advance of extensive revisions of the General Design Memorandum now in progress.

2. Approval in principle of including fisheries storage is requested pending resubmission of the General Design Memorandum.

FOR THE DIVISION ENGINEER:

John Wm Leslie

Incl (10 cys)
Rpt on Fishery Storage

JOHN WM. LESLIE
Chief, Engineering Division

Report
on
PROVISION OF FISHERY STORAGE IN COLEBROOK RIVER DAM AND RESERVOIR

FARMINGTON RIVER
CONNECTICUT RIVER BASIN
CONNECTICUT AND MASSACHUSETTS

16 July 1964

1. Purpose. - The purpose of this report is to furnish basic information on the provision of storage for reservoir and downstream fisheries recommended in reports of the U. S. Fish and Wildlife Service on Colebrook River Dam, dated 12 February and 1 June 1964. These reports include justification and recommendation for three 5,000 acre-foot fishery pools, the provision of which will require modifications in the planned operations of the project and changes in plans to provide additional height of dam. Copies of these reports, which will be Exhibit Nos. 1 and 4 in the revised General Design Memorandum, are attached. Exhibit No. 5 is a sketch showing the fishery pools and their relationship to the flood control and water supply pools.

2. Impact of Changes. - The impact of the proposed structural modifications is limited to an increase of 5 feet in height of dam, dike, intake tower, and the portion of Route 8 crossing the end of dike. Elevations of spillway weir and spillway approach and discharge channels will be raised 5 feet with no change in planned location. Land acquisition and highway relocation were originally planned on the basis of a guide taking line 10 feet above spillway crest. Raising the spillway instead of lowering the guide taking line by 5 feet in accordance with OCE comments on the General Design Memorandum will lessen the impact on real estate and highway relocations planning. The area at spillway crest is increased by 65 acres. No additional improvements are required to be taken. The overall impact of the proposed change on project planning is considered minor.

3. Cost of Proposed Storage. - The additional cost of a 5-foot higher dam is $400,000. A further increase of $100,000 is a result of the addition of a steel tunnel liner for future power and increase of $37,000 in estimated cost of recreational facilities from $20,000 to $57,000. The overall effect is to increase the project cost from $14,500,000 to $15,000,000.

4. Cost Allocations. - The cost allocation originally shown in the General Design Memorandum has been revised in accordance with OCE comments that reservoir clearing is a specific water supply cost. With

the addition of the fishery storage, additional clearing will be required. Reservoir clearing has therefore been allocated to the fishery and water supply features in proportion to the total storage used for each purpose. The cost of Pool b (see paragraph 6) has been allocated to flood control. The effect of adding the fishery storage upon cost allocations is shown in the following tabulation.

COST ALLOCATION
(Use of Facilities Method)

Feature	Without Fishery Pools	With Fishery Pools
Flood Control	$ 8,939,000	$ 8,658,000
Water Supply	5,541,000	5,336,000
Recreation		
Fish & Wildlife Improvement	-	886,000
Recreational Facilities	20,000	57,000
Future Power	-	63,000
TOTAL	$14,500,000	$15,000,000

5. Cost Allocation by Separable Costs-Remaining Benefits Method. - A cost allocation using the separable costs-remaining benefits method is being prepared. It will be forwarded when completed.

6. Description and Operation of Fishery Pools. - The two Fish and Wildlife Reports recommend three fishery pools. Each of them is of 5,000 acre-feet capacity. Sub-paragraphs a., b., and c. discuss each of these pools in detail.

a. Pool a is the holdover pool of the initial planning concept. It is essentially a permanent pool justified on the basis of mitigation of downstream fishery losses expected to occur as a result of future diversion of water into the Metropolitan District system. These losses will not occur until after the diversion is made. Pool a will come into being immediately upon completion of construction and be stored in the unused zone allocated to future water supply. It will remain for a period of several years at the end of which the Metropolitan District will require all of the authorized water supply storage. At that time and for some years thereafter, pool a will be discontinued. At a later date, when substantial amounts of stored water are diverted for domestic use, pool a will be reestablished. Under an agreement to be included in the water supply contract, the Metropolitan District will then maintain a portion of its total reserves in the Colebrook River pool, subject to use in emergencies only. The initial provision of pool a will result in some enhancement, but its future reestablishment is for mitigation purposes.

b. Pool b is for enhancement of the spring shad fishery. Water will be stored in the early spring and released in late April and May. This pool will be stored in the flood control storage zone after the spring snowmelt runoff and be released prior to the hurricane season. Annual benefits are $54,000. The reduction in flood control benefits resulting from this seasonal use of about ten percent of the flood control capacity is considered negligible. Pool b will come into being upon completion of the project and remain operational during the life of the project.

c. Pool c is for enhancement of the sea-run brown trout fishery. Water will be stored in early spring and released in late summer. This storage will require raising the dam by 5 feet. Annual benefits from this pool are $30,000. Pool c will come into being upon completion of the project and remain operational during the life of the project.

7. Water Rights. - The situation as regards water rights in the Farmington River basin is extremely complex. Under State law, riparian agreement, and agreement with the Allied Connecticut Towns, a minimum release of 50 c.f.s. is required at the Goodwin Dam. In addition, the riparian agreement and agreement with the Allied Connecticut Towns require that the Metropolitan District pass all inflows up to 150 c.f.s. This was also a requirement of State law, but was repealed in 1963. Water for dependable operation of the fisheries pool will ultimately have to come from flows under 150 c.f.s. The Connecticut Fish and Game Commission has obtained statements showing a spirit of cooperation which indicates that water rights will be made available as needed.

8. Economics. -

a. Maintenance of Pool a for the initial period of years in the future water supply storage zone is considered in the public interest as the best temporary utilization of the available resource. The provision of Pool a after construction of the diversion tunnel from Goodwin Dam to Barkhamsted Reservoir and the planned diversion of water into the domestic system is justified as a mitigation measure. Provision of Pool a does not increase the project cost.

b. Pool b is justified on the basis of $54,000 in annual benefits. There will be a negligible reduction in flood control benefits and minor operational costs resulting from the necessity of maintaining close control over reservoir operations. Incremental annual costs are estimated to be $3,000 resulting in a benefit to cost ratio of 18 to 1 for Pool b.

c. Annual benefits from Pool c are $30,000. Incremental annual costs are estimated to be $15,000 resulting in a benefit to cost ratio of 2.0 to 1 for Pool c.

8. Cost Sharing. - The allocated cost of the fisheries pools and recreational facilities, $949,000, is much less than the limit of non-reimbursable costs provided in H. R. 9032. Accordingly, the entire cost is non-reimbursable.

3 Incls
1. Ltr frm Fish & Wildlife Service, dtd 12 Feb 64, Exhibit 1
2. Ltr frm Fish & Wildlife Service, dtd 6 Jun 64, Exhibit 4
3. Sketch, Exhibit 5

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
59 TEMPLE PLACE
BOSTON 11, MASSACHUSETTS

February 12, 1964

Division Engineer
U.S. Army Engineer Division, N.E.
Corps of Engineers
424 Trapelo Road
Waltham 54, Mass.

Dear Sir:

This is our conservation and development report on fish and wildlife resources in relation to the Colebrook River Reservoir, Connecticut. It was prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 U.S.C. 661-666 inclusive), in cooperation with the Connecticut State Board of Fisheries and Game and the Massachusetts Division of Fisheries and Game. The Massachusetts Division of Fisheries and Game signified its concurrence in its letter of December 23, 1963. This report was coordinated with the Bureau of Commercial Fisheries and also represents its views. The Connecticut Board of Fisheries and Game has indicated that they feel that satisfactory mitigation of fishery losses can only be accomplished by inclusion of an independent fishery pool in Colebrook Reservoir and not through utilization of a holdover storage pool.

According to information from your agency and others, Colebrook River Reservoir was authorized by the Flood Control Act of 1960 for flood control and water supply storage. The Metropolitan District of Hartford County will participate in the project and utilize the water storage. The reservoir will be located on the West Branch of the Farmington River in the Town of Colebrook, Litchfield County. It is our understanding that the dam site is located about one and one-half miles upstream from Goodwin Dam (Hogback Reservoir). Colebrook River Dam will be located in the 560-acre Hogback Reservoir pool, owned by the Metropolitan District. The upper end of the Colebrook River Reservoir will extend into Massachusetts.

The reservoir site is in a narrow, steep-sided valley with heavily forested slopes. The following is our understanding of the engineering features of the project. The spillway crest of the Colebrook River Dam will be at elevation 756 feet, m.s.l. The reservoir will provide flood storage of 50,800 acre-feet and water supply storage of 30,700 acre-feet. The maximum elevation of the 705-acre water supply pool will be at elevation 700, which is 133 feet above the stream bed.

EXHIBIT 1-1

Most of the land in Connecticut and some land in Massachusetts in the vicinity of the Colebrook River project is already owned by the Metropolitan District in connection with the Hogback Reservoir. Lands needed for the Colebrook River project will be obtained through an agreement with the Metropolitan District. About 175 additional acres of land in both States will be acquired for the project which, at spillway elevation, will encompass approximately 1150 acres.

The water supply pool of Colebrook Reservoir will be operated as required by the Metropolitan District Commission. During the first ten years of operation the water supply pool will be used to satisfy commitments of the M.D.C. to downstream riparian owners who would otherwise be adversely affected by diversion of water from other segments of the watershed for water supply purposes. These riparian owners are primarily interested in the production of hydroelectric power used in their manufacturing operations. These are primarily the Collins Company which operates Collinsville Dam, 16 miles below Goodwin Dam, and the Farmington River Power Company which operates Rainbow Dam about eight miles above the confluence of the Farmington and Connecticut Rivers. Only a minimum release of 50 c.f.s. is required by State law but under agreement with these riparian owners and the Allied Connecticut Towns, Inc., no storage will take place until releases reach 150 c.f.s.

By 1975 or soon thereafter, a tunnel will have been completed from Hogback Reservoir to Barkhamstead Reservoir, and the M.D.C. will proceed to acquire downstream riparian rights either through negotiation or condemnation. At this time water will be shunted to Barkhamstead Reservoir and into the water supply system. With acquisition of riparian rights present riparian releases will cease and eventually only the minimum 50 c.f.s. release at Colebrook Dam will be required. Aside from occasional overflows in the spring freshet period it appears that flows below Colebrook River Dam will eventually be limited to 50 c.f.s. most of the year with flows dropping to 50 c.f.s. for extended periods in extremely dry years. Even this 50 c.f.s. would still be subject to reregulation by riparian owners since this legal minimum could not be bought or condemned by the M.D.C. At this time, around 1975 or soon thereafter, it is expected that both Hogback and Colebrook Reservoirs could be drastically drawn down each year. It is our understanding that the Massachusetts Water Resources Commission gave its approval to the Colebrook River Reservoir project with the understanding that the proposed reservoir would be operated in such a manner as to preclude the need for drawing down Otis Reservoir, Massachusetts, during the recreational period from June 1 to October 1 each year.

Under present conditions there are significant fishing opportunities downstream from Hogback Reservoir mainly of a "put-and-take" nature. Table 1 gives pertinent data on the various reaches below Hogback showing a current use of 51,500 fisherman days annually. At a recreational value of $3.00 per fisherman day, the total value of the estimated fishery in the river was $154,000 in 1962.

Table 1. Pertinent data, fishery downstream from Goodwin Dam

Reach	Est. Miles in Reach	No. of Trout Stocked in 1962	Estimated No. of Fisherman-days 2/
Goodwin Dam to Collinsville	16.0	20,270	30,400
Collinsville to Unionville	3.5	6,570	9,800
Farmington and Tarriffville-Spoonville	1/	7,590	11,300
		34,430	51,500

1/ Miles not estimated since trout are stocked at certain points and not all of this reach is considered trout water.

2/ Considering that 75% of stocked trout are taken at the rate of .5 fish per trip. (No creel census data are available.)

With increasing demands, additional stocking in the future will bring the average annual use of the river between Hogback Dam and Rainbow Dam to 65,000 fisherman days. Hogback Reservoir will provide fishing for chain pickerel and for stocked trout. Extensive summer drawdowns inhibit the fishery utilization which will average 3,000 man days over the life of the project. In the upstream segment of the Colebrook Reservoir site there are approximately 1½ miles of trout stream which will furnish 75 fisherman days annually. Downstream from Rainbow Dam there is a sport fishery for shad amounting to 2,000 fisherman days annually. This is limited by releases from Rainbow Dam which are not large or sustained enough to attract the shad into the fishable segment of the river at all times during the spawning period. It is further limited by the lack of a fishway in Rainbow Dam which would allow shad to utilize upstream areas for spawning and nursery habitat. The State Legislature appropriated money in 1963 for planning such a fishway but it would still be necessary to secure water rights to sufficient stream flow and storage to permit releases for fishway operation and maintenance of suitable flows below Rainbow Dam during the shad spawning period. Pollution in the basin is scheduled to be corrected by 1966 removing any limitations caused by water quality problems.

There is only a minor amount of hunting opportunity for whitetail deer, varying hare, ruffed grouse, and gray squirrels involved in the project area.

During the first ten years of project operation the downstream fishery will not be adversely affected, in fact there may be some benefit to the trout fishery as riparian requirements are satisfied by releases from Hogback rather than down the East Branch. Fishing opportunity in the remaining portion of Hogback Reservoir and in Colebrook Reservoir, based mainly on stocked trout, will amount to 4,000 man days annually, while the upstream fishery will be 25 man days.

Eventually, however, as riparian rights are acquired, the downstream trout fishery will be reduced from 65,000 to 15,000 man days annually, the fishery in the reservoirs will be reduced from 4,000 to 2,000 man days, and the upstream fishery will remain at the reduced figure of 25 man days. Downstream from Rainbow Dam the amount and duration of flows will be further reduced and the shad fishery will drop from 2,000 to 1,000 man days annually. Elimination of drawdown during the summer months in Otis Reservoir will convert these waters from marginal trout waters to a fair trout pond with the opportunity for additional fishing for stocked trout. This is not, however, a direct effect of the project.

From around 1975 through the life of the project there will be an annual loss of 53,000 fisherman days annually compared with the resource potential without the project.

Wildlife resources will suffer no significant losses.

The construction of Colebrook Reservoir will make it possible to store flows which now escape to the ocean and ultimately to divert these so that they will no longer be available in the reaches of Farmington River downstream from Goodwin Dam.

Since the mitigation of the very serious fishery losses this will entail may involve the provision of additional capacity in Colebrook Reservoir, it must be considered now along with other aspects of project construction and operation.

It is our understanding that approximately 5,000 acre-feet of storage could be provided at reasonable cost and could provide a permanent pool of some 240 acres with an average depth of about 20 feet and a maximum depth of 48 feet. The knowledge that year-round trout habitat would be maintained would encourage heavy spring stocking when the reservoir was close to maximum pool. There would not be the present reluctance resulting from the risk of trout losses due to drawdowns later in the season, which would leave a shallow pond too warm to support trout. With adequate access, parking, and boat launching facilities, this would replace the major part of the fishery lost downstream. To provide for a fishery of this magnitude in Colebrook Reservoir would require parking for 350 cars and two launching ramps, in addition to parking and launching for other recreational pursuits. Access should be provided from the Massachusetts portion of the shoreline where the relocation of Route 8 would provide the opportunity to use the abandoned section for access and boat launching. There will still be a loss of some 5,000 fisherman days annually, the loss to the shad fishery would not be mitigated and would form part of this remaining loss.

Under the current water allocations, however, and under M.D.C. plans, the flows available for storage at the Colebrook site would not be sufficient to bring downstream flows to a level which could support a sizeable fishery there for stocked trout, nor would it provide flows necessary for the development of anadromous fisheries.

We have been advised, however, by Commissioner Joseph N. Gill of the Connecticut Department of Agriculture, Conservation, and Natural Resources that it is their intention to request the Connecticut Legislature to allot for storage for wildlife and recreational use those flows in excess of the 50 c.f.s. continuous release required by State law and in excess of the storage capabilities of the water supply segment of Colebrook Reservoir. In order for these waters to be available for fish and wildlife purposes, provision would need to be made for increased storage in Colebrook Reservoir.

If the State did allocate some of the flows between 50 c.f.s. and 150 c.f.s. for fishery purposes, and legal right to store and release additional flows without riparian stoppage were vested in the Connecticut State Board of Fisheries and Game, then the fishery pool could be used either to maintain a reservoir fishery, or on a limited basis and at the State's discretion, to maintain suitable conditions for anadromous fishes in critical periods in the lower river. This would mitigate a portion of the shad fishery losses.

There have been discussions between the various Federal and State agencies involved to explore other possible mitigation measures. The M.D.C. has advanced the proposition that their water supply holdover storage could be held in Colebrook Reservoir providing a 5,000 acre-foot pool which would be drawn upon for water supply only in emergency situations. Low flow releases required by law would not normally be drawn from this pool.

This pool would mitigate fishery losses to the stream fishery for trout to a considerable extent and would be a reasonable equivalent of a single purpose fishery pool in this regard. It would, however, not permit the use of the stored water in the management of the anadromous fisheries and would leave losses to these fisheries unmitigated.

If the State moves to acquire water rights for fishery purposes, then a 5,000 acre-foot pool for fishery purposes would be desirable. In the absence of any such action the operation of Colebrook by M.D.C. to provide a reasonably permanent fishery pool of 5,000 acre-feet would provide mitigation for a major part of the fishery losses.

We recommend, therefore, that--

1. Fishery losses be mitigated through establishment of a 5,000 acre-foot pool for fishery management purposes in Colebrook Reservoir using waters available (a) as emergency supplies in Hartford M.D.C. operations, or (b) from acquisition of downstream privately-owned riparian water rights by the State of Connecticut and construction of 5,000 acre-feet of additional storage capacity for fishery management purposes in Colebrook Reservoir and Farmington River.

2. That access to Colebrook Reservoir specifically for fishermen be provided from both Connecticut and Massachusetts shores, including parking for 350 cars and construction of two launching ramps.

Sincerely yours,

John S. Gottschalk
Regional Director

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
59 TEMPLE PLACE
BOSTON, MASSACHUSETTS 02111

June 1, 1964

Division Engineer
New England Division
U. S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

Your letter of March 18, 1964 asked about the feasibility of establishing a sizeable new fishery on the Farmington River as a consequence of providing 1.6 billion gallons of new storage for fishery purposes in Colebrook Reservoir. Your query was in relation to figures in the Farmington River Watershed Association's news release of March 5.

This letter constitutes a report on sport-fishery development features of the Colebrook project and was prepared under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-666 inclusive). It was prepared in cooperation with the Connecticut Board of Fisheries and Game and has its concurrence as indicated in its letter of May 19, 1964.

Since the Allied Connecticut Towns, Inc. have signified in their letter of April 10 to the Connecticut Board of Fisheries and Game that they will cooperate in achieving a regimen beneficial to aquatic life and recreation, we are basing our analysis on the discretionary use of flows from 50 c.f.s. to 150 c.f.s. to achieve this regimen. The Board has also received the assurance of the Collins Company in their letter of April 7 that it will pass any stored water through their dam, and the Metropolitan District Commission in its letter of April 2 stated that disposition of waste water would not be of concern to them. This analysis is also contingent on construction of the fishway past Rainbow Dam which is presently in the planning stage.

While the provision only of a Metropolitan District Commission holdover pool of 1.6 billion gallons or of a fishery pool of this size would, over the project life, result in a net annual loss to the sport fishery, the combination of these two pools presents a much more desirable situation. This combination would eliminate any loss of fishing opportunity and would, in addition, provide for development of an expanded sport-fishery for American shad with average annual benefits of 18,000 fisherman days worth $54,000 as a net recreational benefit. With assurance of these

EXHIBIT 4-1

two pools, development of this expanded shad fishery could begin immediately so that this annual benefit would date from project completion.

If a regimen could be provided through the cooperative use of the various reservoir pools or through seasonal encroachment on the flood storage pool which would (1) allow the storage of early spring runoff from 50 c.f.s. to 150 c.f.s. and of any available waste water, (2) provide 1.6 billion gallons for the spring spawning and nursery period of American shad, and (3) still leave the M.D.C. holdover pool and the fishery pool full as we enter the summer, then there would be the potential for establishment also of a fall fishery for sea-run brown trout. Since development of this fishery could be concurrent with development of the shad fishery, an average annual benefit of 10,000 fisherman days would date from project completion and would have a net annual value of $30,000.

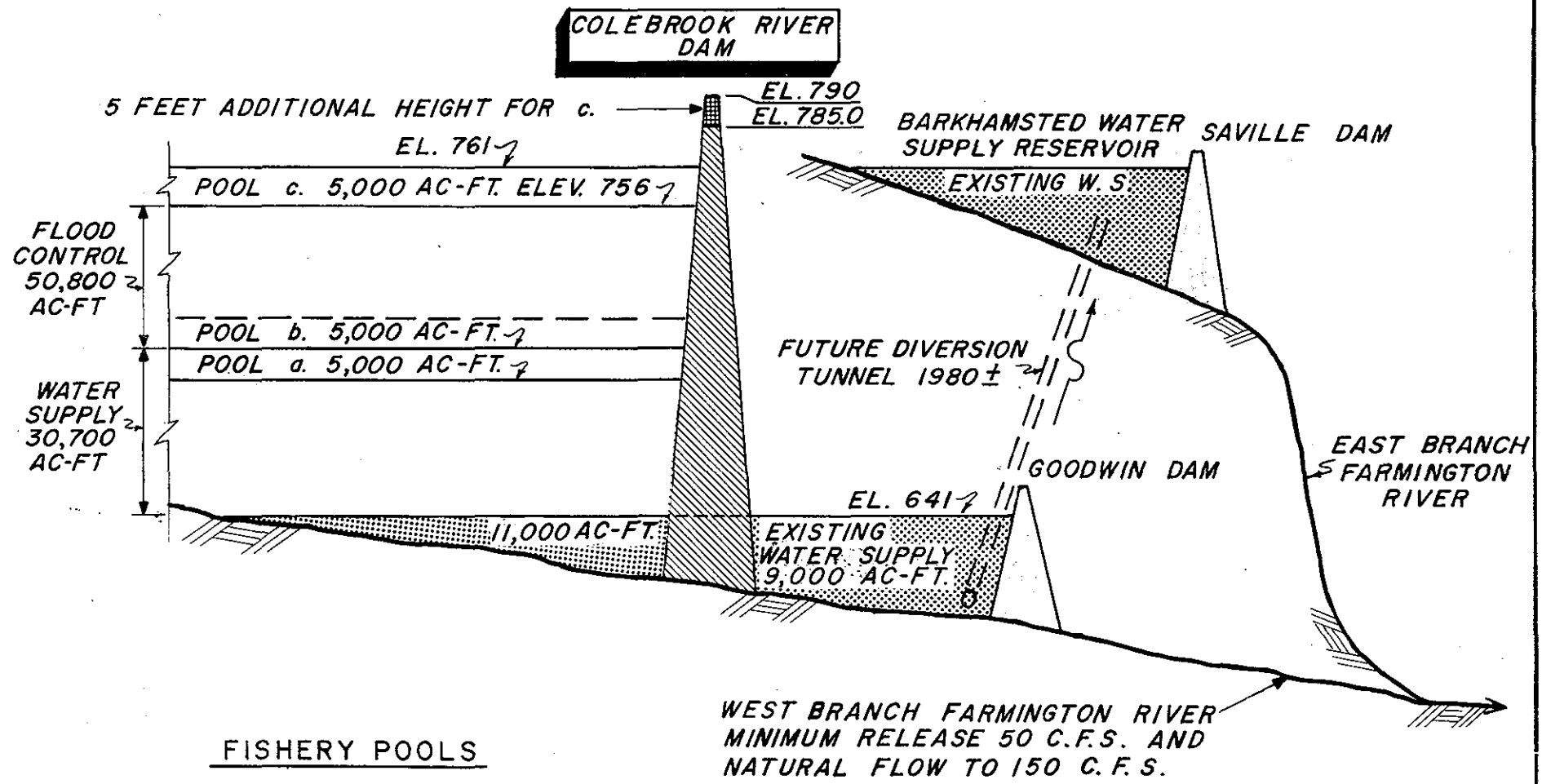
We would therefore recommend--

1. That in addition to a holdover pool of 1.6 billion gallons, Colebrook Reservoir contain a fishery pool of 1.6 billion gallons.

2. That through cooperative use of available water and available storage capacity, an additional 1.6 billion gallons be made available for fishery use.

Sincerely yours,

Eugene E. Crawford
Acting Regional Director



FISHERY POOLS

POOL a. 5,000 AC-FT. HOLDOVER POOL, IN WATER SUPPLY ZONE

POOL b. 5,000 AC-FT. FOR SHAD, IN FLOOD CONTROL ZONE

POOL c. 5,000 AC-FT. FOR SEA-RUN BROWN TROUT, REQUIRES RAISING DAM

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

CONNECTICUT RIVER FLOOD CONTROL

COLEBROOK RIVER DAM

FISHERY POOLS

DATE: JULY 1964

EXHIBIT 5